

46184

DYNAMAC
CORPORATION
Environmental Services

53 Darby Road
Paoli, PA 19301

Telephone: 215-889-3900
Fax: 215-889-9474

November 6, 1991

HAND DELIVERY

Mr. Randy Sturgeon
U.S. Environmental Protection Agency
841 Chestnut Building
Philadelphia, PA 19107

Re: Contract No. 68-W9-0005 (TES VIII)
Work Assignment No. C03034
Du Pont Newport Landfill
Risk Assessment
Subject: Technical Review Comments

Dear Mr. Sturgeon:

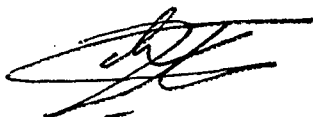
Dynamac is pleased to present its letter report containing technical review comments on the Risk Assessment for the Du Pont Newport Landfill. This report is submitted in partial fulfillment of Task 3 of the Work Plan for the abovereferenced work assignment.

As indicated in Task 3 of the Work Plan, Dynamac is prepared to attend a review meeting with EPA to discuss the Risk Assessment and the technical review comments. Dynamac will schedule this meeting at the convenience of EPA when requested.

If questions or comments arise concerning this letter report, do not hesitate to telephone Dynamac at (215) 889-3900.

Sincerely,

DYNAMAC CORPORATION



Camille Costa, P.E.
Project Manager

Enclosure

cc: Ms. Donna McGowan, USEPA CERCLA RPO
Mr. Robert Stecik, Dynamac-Philadelphia Operations

DYNAMAC
CORPORATION

Environmental Services

53 Darby Road
Paoli, PA 19301

Telephone: 215-889-3900
Fax: 215-889-9474

November 6, 1991

HAND DELIVERY

Mr. Randy Sturgeon
U.S. Environmental Protection Agency
841 Chestnut Building
Philadelphia, PA 19107

Re: Contract No. 68-W9-0005 (TES VIII)
Work Assignment No. C03034
Du Pont Newport Landfill
Risk Assessment
Subject: Technical Review Comments

Dear Mr. Sturgeon:

In response to a request from the U.S. Environmental Protection Agency (EPA), Dynamac reviewed the Draft Risk Assessment for Work Assignment No. C03034, as part of the abovereferenced Technical Enforcement Support Contract. The following document was reviewed in conjunction with this effort:

- Draft Risk Assessment, Du Pont-Newport Site, Newport, Delaware; prepared by Woodward-Clyde Consultants; dated October 14, 1991 (the report).

For the review, the following questions were posed:

1. Was all the available data used, or was exclusively the Phase III data used?
2. Is the data used correct?
3. Does the information Dynamac has on the split-sampling match that of the report?
4. Does the report address all the chemicals of concern?
5. Is the groundwater modeling technically sound?

The objective of the review was to answer these five questions. Dynamac's responses to the questions follow, along with Dynamac's specific comments, suggestions for improvement, and objections to certain technical positions. A summary is provided at the conclusion of this letter report.

November 6, 1991
Mr. Randy Sturgeon
Page 2

Question No. 1. Was all the available data used, or was exclusively the Phase III data used?

Response

Du Pont claimed to have used or considered data from other phases besides Phase III of the report. No evidence from other phases was noticed in the report.

Question No. 2. Is the data used correct?

Response

To the extent determinable by Dynamac, the data is used correctly, with the exception of the items discussed in the response to Question No. 4.

Question No. 3. Does the information Dynamac has on the split-sampling match that of the report?

Response

The quality of the data used for the Risk Assessment was investigated during the analysis of the split-sampling activity conducted during the RI. This analysis is discussed in Section 3 of Dynamac's Data Sufficiency Report Review, dated July 1, 1991.

The split samples obtained by Dynamac included a total of 36 groundwater and soil boring samples. The results from the chemical analysis of these samples were compared with the results from the analysis of the samples collected by Du Pont. Generally, the groundwater split sample results were much closer to Du Pont's than the soil sample results, often within 10% but sometimes as different as an order of magnitude. Of note was the fact that in every soil split sample collected by Dynamac, lead was significantly higher. Lead appeared to be the one prevalent metal in Dynamac groundwater samples not found in the Du Pont samples. The split-sampling program showed that the soil sampling, in general, cannot be trusted to produce reliable numbers for all parameters.

AR311893

November 6, 1991
Mr. Randy Sturgeon
Page 3

Question No. 4. Does the report address all the chemicals of concern?

Response

Toxicity Characteristic Leaching Procedure (TCLP) samples on soils in borings from the Holly Run Area (Volume 2, RI/FS Report, 5/17/91, Appendix C-3) showed levels of barium, lead, chromium, and arsenic above hazardous waste levels. The TCLP parameter was not analyzed in the Ciba-Geigy area borings. Based on the raw chemical data, if TCLP was analyzed at Ciba-Geigy, the levels would have been much worse (Tables 2-3 versus 2-4). While these elements are already among the compounds discussed by Du Pont, the TCLP parameter for these chemicals was not addressed in both the RI and the RA reports.

Other compounds should be considered for the 'compounds of concern' list as presented on page 2-9. Most of these are polycyclic aromatic hydrocarbon compounds (PAHs) that are related to the now listed benzo(a)anthracene. The PAHs are mostly limited to the Ciba-Geigy area, but still qualify for insertion on the list. The suggested additional compounds are presented below with some important statistics.

COMPOUND	MAXIMUM IN SOIL	CARCINOGEN CLASS	MCL
benzo(a)pyrene	2600 ppb	B2	.2 ppb
benzo(k)fluoranthene	5800 ppb	B2	.2 ppb
benzo(b)fluoranthene	5800 ppb	B2	.2 ppb
chrysene	3000 ppb	B2	.2 ppb
dibenzo(a,h)anthracene	650 ppb	B2	.3 ppb
heptachlor epoxide	49 ppb	B2	.2 ppb
indeno(1,2,3-c,d)pyrene	1700 ppb	B2	.4 ppb

The report excluded heptachlor epoxide (first paragraph, page 2-7) because Du Pont said that it was detected below 0.01 mg/kg. This statement is inaccurate even for the 95% UCL.

Dynamac made the following calculations for cancer risk using the model presented in the report and considering five of the recommended additional compounds of concern:

AR311894

November 6, 1991
Mr. Randy Sturgeon
Page 4

COMPOUND	95% UCL	INGESTION FACTOR	DAILY INTAKE	SLOPE FACTOR	RISK
Benzo(a)pyrene	.56	1.01EE-8	5.66EE-9	11.5	6.57EE-8
Benzo(b)fluoran threne	1.08	1.01EE-8	1.09EE-8	1.61	1.77EE-8
Benzo(k)fluoran threne	1.09	1.01EE-8	1.09EE-8	0.76	8.37EE-9
Dibenzo(a,h) anthracene	.26	1.01EE-8	2.52EE-9	12.76	3.25EE-8
Ideno(1,2,3- c,d)pyrene	.42	1.01EE-8	4.2EE-9	2.67	1.13EE-8
Chrysene	.64	1.01EE-8	6.5EE-9	0.05	<u>3.28EE-10</u>
				TOTAL	1.36EE-7

As the risk total indicates, the additional compounds still do not cause the Carcinogenic Risk with Soil Ingestion (Reasonable Maximum Exposure) to exceed the recommended limit of 10^{-4} .

Both the modeled receptor Average Exposure Concentrations and the Reasonable Maximum Exposure Concentrations for both cadmium and tetrachloroethene (Table D-1) were higher than the current Maximum Contaminant Levels (MCLs) for drinking water. This observation can be obtained without lengthy cancer risk calculations.

The lead action level was classified as 1000 ppm for on-site soils and 500 ppm for off-site soils that come in close contact with people. These areas are common throughout the site and the surrounding area but no presentation or detailed discussion was made of this health risk.

Although lead was considered to be a special case and was addressed in soils by an action level, no classification was made for lead in waters (Christina River, wetlands, groundwater). Lead was found in all of these areas above natural background levels.

Question No. 5. Is the groundwater modeling technically sound?

Response

Dynamac's answer to this question is a guarded "yes" with some conditions and stipulated concerns.

The model used in the RI Report is AT123D, a FORTRAN-coded analytical mass transport model that provides a deterministic contaminant concentration at a specified location at a specified time, given a set of initial conditions that specify

AR311895

the contaminant concentration and position at some initial time. AT123D was developed by Dr. George Yeh, during his tenure at Oak Ridge National Laboratory (ORNL). It was published in March of 1981. The model is now disseminated by the International Ground Water Modeling Center (IGWMC), a national and international clearinghouse for public domain groundwater models, located in Golden, Colorado. Dr. Yeh is now on faculty at Pennsylvania State University.

The model makes use of Green's Theorem to compute integrals over a domain, thereby solving the mass transport differential equation. In doing so, the model assumes a uniform flow field and homogeneous aquifer parameters. This means that the groundwater flow rate vector is constant in magnitude and direction.

In Section III of the original ORNL publication, Dr. Yeh notes, "The groundwater characteristics such as seepage velocity, porosity, permeability, dispersivities, etc., are in general not uniform in space. Numerical simulations of groundwater dynamics and mass transport are therefore necessary. However, for the 'first pass' estimates and the design of a monitoring system, transport phenomena on the local scale would be sufficient. Under such circumstances, the assumptions of fairly uniform groundwater characteristics are justifiable."

Upon inspection of the model, provided in-house, and the input data, provided by Woodward-Clyde Consultants, the outputs which were used in the Risk Assessment may be viewed as an accurate and precise delineation of contaminant concentrations at the designated receptor well, given the input parameters used by Woodward-Clyde Consultants, with some substantial reservations, which are specified below.

- a. The RI Report does not denote the complete set of input data values that were used in the model, nor does it provide the model version or a specific listing of the model source code, which is minimal for documentation and verification purposes.

All input parameters for each modeled contaminant should be provided, if only for documentation purposes. This was not done.

In addition, given that the model is in the public domain, the source code associated with the compiled model program should also have been included in the RI Report, for documentation and verification purposes. This was not done.

- b. Woodward-Clyde Consultants contend that the model outputs are conservative, because adsorption retardation is not assumed. Only advection and dispersion of the initial contamination domain are modeled.

The problem relating to this contention is the subjective meaning of 'conservative'. Woodward-Clyde contends that their conservative deterministic model approach simulates only advection and dispersion, and does not introduce adsorption, a retardation factor that would tend to lower concentration of the contaminant at the receptor well. However, this modeling approach could be deemed as more conservative if the groundwater flow direction for each contaminant was assumed to be a straight line from the center of contamination to the receptor well. In many cases, Risk Assessments in RI Reports assume that the highest concentration of groundwater contamination at a receptor well is the highest concentration of a particular contaminant found at the site, without considering advection or the diluting effects of dispersion. Obviously, such a determination is more 'conservative' than that proffered by the RI Report.

Table D-1 of Appendix D denotes the receptor concentrations based on Average Exposure Concentrations and Reasonable Maximum Exposure (RME) Concentrations, the latter of which are essentially higher estimates of contaminant concentration. Modeled concentrations at the receptor well range from 11% to 0.03% of the highest concentration associated with any particular contaminant domain. As such, the model exercise, which simulates advection and dispersion in a uniform flow field, reduces the contaminant concentration at the receptor well by at least one order of magnitude, and up to three orders of magnitude. Obviously, this is not the most conservative approach which could be taken in analyzing the concentration at the receptor well.

Dynamac recommends that the direction of groundwater flow from each contaminant center of mass used in the model be oriented toward the nearest receptor well, rather than oblique to the nearest receptor well, as may be seen in the RI Report graphics (Figures 1-10 of Appendix D). Such

an approach would be more conservative than that undertaken by Woodward-Clyde, but not as conservative as using the existent highest concentrations found in the groundwater system. Under such a scenario, the X-axis would be oriented from the center of contaminant mass directly toward the nearest receptor well.

- c. The RI Report contends that the contamination at the site which is liable to reach the receptor wells is a slug, a fixed mass, and not a plume from a continuous source. In general, a slug of contaminant, under advection and dispersion, will produce concentrations at any given position that are far less than a plume from a continuous source.

Dynamac recommends that the model be run under the assumption that the source is continuous, and that the contamination represents a plume of contaminant. Such a scenario is more conservative than that of the RI Report, and may be compared with the slug scenario and the flow directional scenario (discussed in b. above) in a consideration of the uncertainty associated with the model input parameters. In effect, both suggested scenarios reflect worst case situations, given the data.

- d. The answer to the question, "Is the groundwater modeling technically sound?", is that the particular mathematical model used in the analysis is capable of providing a first approximation given a set of simple conditions. If one accepts the conditions (a slug of material, the flow direction, the dispersivity factors, and the rectangular approximation to the curvilinear contamination isopleths), then the answer is "yes". On the other hand, if one wants to consider the uncertainty of these parameters (the worst case), then the answer is "no". This does not mean that the mathematical model is theoretically invalid. What it does point out is that the hydrogeologic conclusions and parameters have a degree of uncertainty that should be accounted for in a deterministic modeling exercise that is designed to provide parameters for a Risk Assessment.

In summary, the report provides an exhaustive study of the cancer and toxic risks that may be caused by the chemicals that are present on the Du Pont site and the surrounding related areas. The

AR311898

November 6, 1991
Mr. Randy Sturgeon
Page 8

evaluation was performed by choosing several 'compounds of concern' and from this list, compiling risk levels for cancer and a general health hazard for a variety of scenarios. The scenarios seemed comprehensive enough and covered issues as detailed as 'inhalation of seeps' and 'ingestion of soils' for each area in question.


For most situations, this format provided a quantitative study of the chemical hazards on-site. The two areas that showed hazardous conditions according to the study are the Old Airport Road (residential wells) and the Ciba-Geigy work area. Both areas showed Hazard Indices (non-cancerous) over the acceptable level of 1.0 and Cancer Risks below but within an order of magnitude of the acceptable limit of $1\text{E-}4$ (Table 6-1). No areas showed calculated cancer risks over the limit set by EPA, although a known Carcinogenic Slope Factor for lead could have tipped the Cancer Risk to values greater than the accepted levels. In this way the cancer risk calculations were limited, because lead was so prevalent on-site.

As a final note on the model, the weight of evidence suggests that the modeling analysis is not as conservative as it could be, given the uncertainty associated with the input model parameters and the reduction in contaminant concentration found at the nearest receptor well.

Dynamac feels that incorporating the comments presented in this letter report may result in a Risk Assessment of higher quality, and suggests the comments be incorporated.

Sincerely,

DYNAMAC CORPORATION



Camille Costa, P.E.
Project Manager

AR311899